REMARKS/ARGUMENTS

Claims 3 and 4 are pending in this application.

Claims 3 and 4 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Niimi et al. (JP 2000-256062) in view of Kawamoto (JP 2002-043103). Applicant respectfully traverses the rejections of Claims 10-28.

Claim 3 recites:

> A multilayer positive temperature coefficient thermistor comprising:
> a multilayer element main body including a plurality of stacked ceramic layers including a barium titanate semiconductor ceramic exhibiting a positive temperature characteristic of resistance and a plurality of internal electrodes including nickel, the internal electrodes being disposed at the interfaces of the ceramic layers; wherein **the following conditions are satisfied:**
>
> $$5 \leq X \leq 18; \text{ and}$$
>
> $$4 \leq X \cdot Y \leq 10;$$
>
> **wherein X is a thickness expressed in μm of each ceramic layer between the internal electrodes and Y is a donor content expressed in percentage in the barium titanate semiconductor ceramic expressed in terms of (number of donor atoms/number of Ti atoms) × 100**. (emphasis added)

Applicant's Claim 4 recites features and method steps that are similar to the features recited in Applicant's Claim 3, including the above-emphasized features.

With the unique combination and arrangement of features and method steps recited in Applicant's Claims 3 and 4, including the above-emphasized features, Applicant has been able to provide a multilayer PTC thermistor that can reliably decrease the resistance by decreasing the thickness of ceramic layers and achieve a resistance close to the resistance calculated from the multilayer structure, and a method for designing a PTC thermistor that achieves the advantages described above (see, for example, paragraph [0020] on page 4 of the Substitute Specification).

As disclosed in paragraphs [0021]-[0024] of the originally filed specification, the present inventors discovered that, during the step of baking a green element main body performed to make a multilayer PTC thermistor, nickel contained in the internal

electrodes diffuses into adjacent ceramic layers, that the diffused nickel acts as an acceptor, and that the influence of the diffused nickel near the internal electrodes increases as the thickness of the ceramic layer is decreased. As a result, the resistance of the ceramic layers is increased, thereby preventing a decrease in the resistance of the PTC thermistor.

To put it briefly, the present invention pays particular attention to a donor contained in the barium titanate semiconductor ceramic constituting the ceramic layers, the donor being capable of canceling out the action of nickel as an acceptor. The factor that prevents the resistance reduction is eliminated by regulating the amount of the donor within a particular range. More particularly, the inventors of the present invention discovered that by satisfying the conditions of $5 \leq X \leq 18$ and $4 \leq X \cdot Y \leq 10$, wherein X is a thickness expressed in μm of each ceramic layer between the internal electrodes and Y is a donor content expressed in percentage in the barium titanate semiconductor ceramic expressed in terms of (number of donor atoms/number of Ti atoms) × 100 as recited in Applicant's Claim 3, and similarly in Applicant's Claim 4, the resistance can be reduced.

The Examiner alleged that Niimi et al. teaches all of the features recited in Claims 3 and 4, except for the feature of the thickness of the ceramic layer between the internal electrodes. The Examiner further alleged that Kawamoto teaches a ceramic layer thickness of less than 20 μm, and that this thickness prevents "nickel diffusion" and "high resistance" of the ceramic layers. Thus, the Examiner concluded that it would have been obvious to use the ceramic thickness of less than 20 μm in order to obtain the advantage of preventing nickel diffusion and high resistance of the ceramic layer. Applicant respectfully disagrees.

Paragraph [0017] of Kawamoto discloses a specific process, "1/106 of the balanced oxygen tension from which metal nickel turns into nickel oxide in a layered product with this laminating mold semi-conductor ceramic component 10 by calcinating in the reducing atmosphere made into the following oxygen tension and carrying out

reoxidation processing" which prevents the diffusion of nickel and high resistance. It is this process, and **not** the thickness of the ceramic layer, which prevents nickel diffusion and high resistance. In fact, Kawamoto specifically discloses that when the thickness of the ceramic layer is less than 20 μm, nickel diffusion and high resistance occurs, and that at thicknesses greater than 20 μm, nickel diffusion and high resistance do not substantially occur (see, for example, paragraph [0017] of Kawamoto). In other words, in the absence of the process of Kawamoto described above, Kawamoto clearly discourages the use of a ceramic layer having a thickness less than 20 μm.

A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that the applicant took. In re Gurley, 27 F.3d 551, 31 USPQ 2d 1130, 1131 (Fed. Cir. 1994).

Thus, Applicant respectfully submits that there would have been no proper motivation to combine the teachings of Kawamoto with Niimi et al.

In addition, neither Niimi et al. nor Kawamoto teaches or suggests any specific relationship between the thickness of the ceramic layer and the donor content. Thus, Niimi et al. and Kawamoto certainly fail to teach or suggest the features of "$5 \leq X \leq 18$ **and** $4 \leq X \cdot Y \leq 10$, wherein X is a thickness expressed in μm of each ceramic layer between the internal electrodes and Y is a donor content expressed in percentage in the barium titanate semiconductor ceramic expressed in terms of (number of donor atoms/number of Ti atoms) × 100" (emphasis added) as recited in Applicant's Claim 3, and similarly in Applicant's Claim 4.

Accordingly, Applicant respectfully submits that Niimi et al. and Kawamoto, applied alone or in combination, fail to teach or suggest the unique combination and arrangement of features recited in Applicant's Claims 3 and 4.

Accordingly, Applicant respectfully requests reconsideration and withdrawal of the rejection of Claims 3 and 4 under 35 U.S.C. § 103(a) as being unpatentable over Niimi et al. in view of Kawamoto.

In view of the foregoing remarks, Applicant respectfully submits that Claims 3 and 4 are allowable.

In view of the foregoing remarks, Applicant respectfully submits that this application is in condition for allowance. Favorable consideration and prompt allowance are solicited.

To the extent necessary, Applicant petitions the Commissioner for a Two-Month Extension of Time, extending to November 19, 2007 (November 18, 2007 falls on a Sunday), the period for response to the Office Action dated June 18, 2007.

The Commissioner is authorized to charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 50-1353.

Respectfully submitted,

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